REMARKS

Claims 18, 20-38 and 62-73 are pending. Claims 18, 27, 30, 31 and 67 have been amended to more particularly point out the claimed invention. In particular, claim 30 has been written in independent form through the incorporation of text from claim 18, although the concept of glass has been revised for a more general coating composition. The support for the more general coating composition is supported by the specification, for example, at page 13, lines 6-21. The specification supports the amendments of claims 18 and 27, for example, at page 12, line 28 to page 13, line 21, page 52, lines 3-16, page 57, lines 5-8 and page 58, lines 26-28. The specification supports the amendment of claim 67, for example, at page 12, line 28 to page 13, line 21. Furthermore, the specification has been amended to update the reference to copending patent applications that have subsequently issued. No new matter is introduced.

Claims 33-38 and 71-73 have been allowed, and claims 29-32 have been found allowable. Claims 18, 20-28 and 62-70 stand rejected. Applicant respectfully requests reconsideration of the remaining rejections based on the above amendments and the following remarks.

Rejection Over Thaler in view of Whitney et al. and Allen

The Examiner rejected claims 18, 20, 22-28, 62, and 64 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,547,716 to Thaler (Thaler) in view of U.S. Patent 5,043,548 to Whitney et al. (Whitney) and further in view of Allen et al., J. Vac. Sci. Technol., 16(2), Mar/Apr 1979 (Allen). With all due respect, Applicant respectfully maintains that Applicant's claimed invention is clearly distinct from the teachings of the combined disclosures of the cited references. Nevertheless, to advance prosecution Applicant has amended independent claims 18 and 27 to more particularly point out their claimed invention. Applicant notes that Whitney and Allen teach a particular configuration that is very distinct from the

claimed configuration that teaches away from Applicant's claimed invention. Especially in view of the claim amendments, the combined teachings of the cited references clearly do not render the claimed invention *prima facie* obvious. Applicant respectfully requests reconsideration of the rejections based on the following comments.

Under a Graham analysis, the differences between the claimed subject matter and the teachings of the references must be examined. See *KSR International. Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1729 (2007). In evaluating the differences between the prior art and the claimed invention, the invention as a whole must be considered. Stratoflex, Inc. v. Aeroquip Corp. 218 USPQ 871 (Fed. Cir. 1983). Similarly, a prior art reference must be considered "as a whole, including portions that would lead away from the claimed invention." W. L. Gore & Associates, Inc. v. Garlock, Inc., 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Under Graham, the evaluation of the teachings is performed from the perspective of a person of ordinary skill in the art. "A person of ordinary skill is also a person of ordinary creativity, not an automaton." KRS Int'l Co., 127 S.Ct. at 1742.

The Supreme Court has recently clarified that the examination of the teachings of the prior art should not be performed rigidly. Specifically, "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions." KSR Int'l Co., 127 S.Ct. at 1731. "Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person of ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." Id. The Court noted that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. This is so because inventions in most, if not all, instances rely upon building blocks long since

uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." Id. "Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." Id.

In the Examiner's response to Applicant's arguments, the Examiner acknowledges Applicant's assertions that Whitney and Allen teach away, but these assertions do not seem to be addressed other than to note that Whitney teaches moving the substrate. The question then is how does Whitney teach to move the substrates in the embodiments of Thaler, and not just that it teaches moving substrates. Whitney teaches moving the substrate to scan the laser across the substrate. Then, the Examiner refers to Allen and a statement that laser assisted CVD is **self limiting**. First, the presently claimed method is not laser-assisted CVD. Second, the **self limiting comment in Allen** relates to the **thickness** of the resulting coating due to the reflection of the laser from the product metallic surface, which is not at all an issue with respect to Applicant's claimed technique and **which does not relate in any way to moving the substrate or not since the Allen method is self limiting whether or not the substrate is moved.**

According to Allen, the "experimental **requirements** for pyrolytic LCVD are shown in [Allen's] Fig. 1." Fig. 1 shows the laser striking the substrate. Thus, Allen, like Whitney, teaches away from Applicant's claimed invention. The light reactive deposition approach of Applicant's claimed invention differs in fundamental mechanistic ways from the LCVD approach of Whitney and Allan. "The court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious. ... The fact that the elements worked together in an unexpected and fruitful manner supported the conclusion that Adam's design was not obvious to those skilled in the art." *KSR Int'l Co.*, at 1740. The fundamental question is what do Whitney and Allen teach with respect to the Thaler processes.

The Examiner asserts that "all of the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of invention." With all due respect, this statement is not correct. In particular, the results are not predictable.

Most of the teachings of the cited references teach a laser directed at a substrate for the deposition process. In particular, Whitney and Allen teach this configuration as being necessary for their process. This is laser assisted-CVD. Only a few embodiments of Thaler involve a substrate not in the laser beam, and the substrate in these embodiments is **simultaneously** coated over the whole substrate, which is more analogous to conventional CVD with sputtering although combined with a plasma assist. It is not clear at all how the process of Thaler involving simultaneously coating of the whole substrate would be changed if the substrate is moved. Similarly, there is no teaching in Thaler of how to modify the apparatus to perform this function or how to move the substrate, since it is configured to coat the entire surface at once. The combined teachings simply do not provide a reasonable expectation of success to a person of ordinary skill in the art with respect to Applicant's claimed invention. This is especially true since Allen and Whitney clearly teach that the laser **must be directed toward the substrate** to be coated for their deposition process to work, which must be considered when viewing the references as a whole, even though the shortcomings of individual references are not viewed in isolation. The combined teaches of the references simply do not point in any way toward Applicant's claimed invention and they do not provide a reasonable expectation of success.

Let's consider Thaler in more detail. While the principle embodiments in Thaler involve a substrate in the path of the laser beam, Thaler teaches two types of substrates that are not in the path of the laser beam. The substrates of a first group, while not in the path of the laser beam, are within the plasma generated in the reaction chamber: element 34 in Fig. 1. The substrates of

a second group not in the path of the laser beam are placed adjacent to the plasma: element 44 in Fig. 4, element 44 in Fig. 5, and element 96 in Fig. 13. The deposition onto substrate 34 is described as a conventional chemical vapor deposition process that is basically equivalent to the deposition on the substrate that intersects with the laser beam. See column 3, line 63 to column 4, line 16. On the other hand, the deposition onto substrate 44 is described as collecting a loose powder. See, column 5, lines 17-37. There is nothing in these descriptions that suggest in any way a desire to move the substrates. The teachings in Whitney do not combine with Thaler to suggest moving substrates 34 or 44 in Thaler since the reason to move the substrate in Whitney is to scan the laser beam across the substrate to extend the coating. The coating in Thaler of substrates 34 and 44 is not dependent on scanning a laser beam.

Furthermore, **the Examiner is ignoring the feature of the claim of a reactant flow from an inlet comprising metal or metalloid precursors** that are reacted to form the product composition. Both independent claims 18 and 27 presently refer to the delivery of a metal or metalloid precursor **from** a reactant inlet into the reaction region. The Examiner points to the description of metal or metalloid dopants in Thaler at columns 5, 6, 8 and 11. With all due respect, the teaching of a metal or metalloid dopant in Thaler does not support the Examiner's position. With all due respect, the Examiner has ignored this feature with respect to the Response to Arguments section. See, MPEP 2141 (2)(b), emphasis added, "Ascertaining the differences between the claimed invention and the prior art requires interpreting the claim language, see MPEP § 2111, and considering **both the invention and the prior art as a whole.**"

Even though Applicant strenuously maintains that the claims were allowable as previously filed, to advance prosecution Applicant has amended claims 18 and 27 to emphasize the distinctions with laser-assisted CVD. In particular, laser-assisted CVD results in the deposition of a dense film, while in light reactive deposition (LRD^{TM}) a particle coating is

deposited. In contrast, Applicant's specification discusses in some detail the consolidation of the particle coating to form a dense film. The relevant claims presently recite a particle coating with identifiable primary particles.

Allen discusses the deposition of a film, which is hot based on the orientation of the laser. Thaler discusses the formation of a very hard deposit that approaches the hardness of diamond. See column 6, lines 15-20. Whitney teaches a particulate raw material that is at least partially melted to enable the deposition, and the laser is again pointed at the deposition substrate. The cited references alone or combined do not teach a particle coating with identifiable primary particles, except for the description of the collection of a loose powder with respect to substrate 44, which does not seem particularly relevant to Applicant's claimed invention.

In view of the clarifying claim amendments, a comparison of the differences between the cited references and the claimed invention reveal several fundamental and irreconcilable differences. The cited reference alone or combined do **not** teach or suggest a reactive flow configuration as claimed or any reason to move a substrate in Applicant's claimed configuration. Furthermore, the references alone or combined do not teach or suggest a particle coating with identifiable primary particles, as claimed by Applicant.

Furthermore, the Whitney and Allen references both teach that the substrate should be intersected by the laser beam, and thus these references teach away form the claimed invention that explicitly excludes this configuration. Thus, there are very significant changes in the respective functions of elements between the claimed method and the methods of the cited references. The differences between the claimed subject matter and the teachings of the cited references are clearly not a simple matter of combining elements with predictable results since the elements are configured in fundamentally different ways in the claimed methods.

"A court must ask whether the improvement is more than the predictable use of prior-art elements according to their established functions. Following these principles may be difficult if

the claimed subject matter involves more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for improvement." *KSR Intern. Co.*, 127 S. Ct. at 1731. Under the present facts, none of the references teach or suggest the claimed reaction and coating configuration. Similarly, none of the references point to **any problem at all** that can be solved by the claimed coating configuration of the pending claims. Actually, Whitney and Allen suggest that the laser beam must strike the deposition substrate, and Thaler teaches that in most embodiments, the laser strikes the substrate. Thaler just teaches that in some embodiments, the substrate can be placed away from the laser beam to allow for the simultaneous coating of the entire substrate. The presently claimed coating method has the capability for forming very high quality coatings at high coating rates with a broad range of chemical compositions as described in published U.S. application 2005/0019504A to Bi et al., entitled "High Rate Deposition of High Quality Optical Coatings." The cited references simply do not point a person of skill in the art toward the claimed invention.

The claimed subject matter has fundamental differences with the teachings of the cited references. The present claims are clearly not rendered *prima facie* obvious by the combined teachings of the cited references. Applicants respectfully request withdrawal of the rejection of claims 18, 20, 22-28, 62, and 64 under 35 U.S.C. § 103(a) as being unpatentable over Thaler in view of Whitney and further in view of Allen. Applicant does not acquiesce in the Examiner's assertions regarding the dependent claims, although Applicant does not generally comment further on these issues since these issues are moot in view of the comments above.

Rejection Over Thaler, Whitney et al., Allen et al. and Rao et al.

The Examiner rejected claims 21, 63 and 65-70 under 35 U.S.C. § 103(a) as being unpatentable over Thaler, Whitney and Allen as applied above and further in view of U.S. Patent

5,874,134 to Rao et al. (Rao). Claim 21 depends from claim 18. Claims 63 and 65-66 depend from claim 27. As described below, Rao fails to make up for the deficiencies of Thaler, Whitney and Allen. Furthermore, Rao teaches away from the claimed method. Applicant respectfully request reconsideration of the rejection based on the following comments.

With respect to the claims depending from claims **18 and 27**, the list of deficiencies of Thaler, Whitney and Allen are described in detail above. As with Whitney, Allen and most of the embodiments of Thaler, Rao teaches directing a laser beam at the substrate. Rao does not teach a light beam that "does not intersect with the substrate," and Rao does not teach "a flow that passes through the light beam, "a reactive flow that reacts "to produce within the flow a product stream comprising particles downstream from the light beam." ... There are multiple deficiencies that are not addressed at all by Rao. Clearly, the combined teachings of Thaler, Whitney, Allen and Rao do not come close to rendering claims 18 or 27 *prima facie* obvious.

Independent claim 67 has been amended to clarify the nature of the recited heating step. In particular, it has been clarified that the heating step is performed subsequent to the deposition. Thus, independent claim 67 has some character similar to allowed claim 30. Thus, Applicant asserts that amended claim 67 is allowable for similar reasons as claim 30. Specifically, none of the references alone or combined teach a subsequent heating step as described in claim 67.

For the reasons discussed above, the combined teachings of the cited references do not render Applicant's claimed invention *prima facie* obvious. Applicant respectfully requests withdrawal of the rejection of claims 21, 38, 63 and 65-70 under 35 U.S.C. § 102(b) as being obvious over Thaler, Whitney and Allen in view of Rao.

CONCLUSIONS

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,

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